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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1 53(b))

Attorney Docket No	042390.P5444
First Inventor or Application Identifier	Eskildsen et al.
Title	IC Package With Edge Connect Contacts
Express Mail Label No	EL079456148US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1 [X] * Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original, and a duplicate for fee processing)

2 [X] Specification [Total Pages 21] (preferred arrangement set forth below)
- Descriptive title of the Invention
- Cross References to Related Applications
- Statement Regarding Fed sponsored R & D
- Reference to Microfiche Appendix
- Background of the Invention
- Brief Summary of the Invention
- Brief Description of the Drawings (if filed)
- Detailed Description
- Claim(s)
- Abstract of the Disclosure

3. [X] Drawing(s) (35 U S.C. 113) [Total Sheets 3]

4 Oath or Declaration [Total Pages 5]
- a [X] Newly executed (original or copy)
- b [ ] Copy from a prior application (37 C F R § 1 63(d)) (for continuation/divisional with Box 17 completed) [Note Box 5 below]
  - i [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 C F R §§ 1 63(d)(2) and 1 33(b).

5 [ ] Incorporation By Reference (useable if Box 4b is checked) The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered to be part of the disclosure of the accompanying application and is hereby incorporated by reference therein

6 [ ] Microfiche Computer Program (Appendix)

7 Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary)
- a [ ] Computer Readable Copy
- b [ ] Paper Copy (identical to computer copy)
- c [ ] Statement verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

8. [X] Assignment Papers (cover sheet & document(s))
9 [ ] 37 C F R.§3.73(b) Statement (when there is an assignee) [ ] Power of Attorney
10 [ ] English Translation Document (if applicable)
11 [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
12 [ ] Preliminary Amendment
13. [X] Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
14 [ ] * Small Entity Statement(s) (PTO/SB/09-12) [ ] Statement filed in prior application, Status still proper and desired
15 [ ] Certified Copy of Priority Document(s) (if foreign priority is claimed)
16. [ ] Other. .....

* A new statement is required to be entitled to pay small entity fees, except where one has been filed in a prior application and is being relied upon.

17. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: _____/_____

Prior application information Examiner _____ Group / Art Unit. _____

18. CORRESPONDENCE ADDRESS

[ ] Customer Number or Bar Code Label (Insert Customer No or Attach bar code label here) or [X] Correspondence address below

Name	Amy Armstrong				
	Blakely, Sokoloff, Taylor & Zafman LLP				
Address	12400 Wilshire Boulevard				
City	Los Angeles	State	CA	Zip Code	90025-1026
Country	USA	Telephone	(512) 434-2400	Fax	(512) 434-2401

Name (Print/Type)	Amy Armstrong	Registration No (Attorney/Agent)	P42,265
Signature	Amy Armstrong	Date	6-23-98

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Patent fees are subject to annual revision on October 1
These are the fees effective October 1, 1997
Small Entity payments must be supported by a small entity statement, otherwise large entity fees must be paid See Forms PTO/SB/09-12

TOTAL AMOUNT OF PAYMENT ($) 830

Complete if Known	
Application Number	
Filing Date	
First Named Inventor	Eskildsen et al.
Examiner Name	
Group / Art Unit	
Attorney Docket No	042390.P5444

METHOD OF PAYMENT (check one)

1. ☐ The Commissioner is hereby authorized to charge indicated fees and credit any over payments to

Deposit Account Number: 02-2666
Deposit Account Name: Blakely, Sokoloff, Taylor & Zafman

☒ Charge Any Additional Fee Required Under 37 CFR 1 16 and 1 17 ☐ Charge the Issue Fee Set in 37 CFR 1 18 at the Mailing of the Notice of Allowance

2. ☒ **Payment Enclosed:** ☒ Check ☐ Money Order ☐ Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	790	201	395	Utility filing fee	790
106	330	206	165	Design filing fee	
107	540	207	270	Plant filing fee	
108	790	208	395	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 790

2. EXTRA CLAIM FEES

		Extra Claims		Fee from below	Fee Paid
Total Claims	14	-20** =		X	=
Independent Claims	3	- 3** =		X	=
Multiple Dependent					=

**or number previously paid, if greater, For Reissues, see below

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	22	203	11	Claims in excess of 20
102	82	202	41	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	82	209	41	** Reissue independent claims over original patent
110	22	210	11	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	400	216	200	Extension for reply within second month	
117	950	217	475	Extension for reply within third month	
118	1,510	218	755	Extension for reply within fourth month	
128	2,060	228	1,030	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,320	241	660	Petition to revive - unintentional	
142	1,320	242	660	Utility issue fee (or reissue)	
143	450	243	225	Design issue fee	
144	670	244	335	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	50	123	50	Petitions related to provisional applications	
126	240	126	240	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	40
146	790	246	395	Filing a submission after final rejection (37 CFR 1 129(a))	
149	790	249	395	For each additional invention to be examined (37 CFR 1 129(b))	

Other fee (specify) _____

Other fee (specify) _____

* Reduced by Basic Filing Fee Paid

SUBTOTAL (3) ($) 40

SUBMITTED BY				Complete (if applicable)	
Typed or Printed Name	Amy M. Armstrong			Reg Number	P42,265
Signature	Amy Armstrong	Date	6-23-98	Deposit Account User ID	

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Docket No.: 042390.P5444

United States Patent Application

For

IC PACKAGE WITH EDGE CONNECT CONTACTS

Inventors: Steven R. Eskildsen
Jeffrey C. Franz
David S. Brannam

Prepared by: Blakely, Sokoloff, Taylor, & Zafman
12400 Wilshire Boulevard
7th Floor
Los Angeles, CA 90025-1026
Tel: 512.434.2400
Fax: 512.434.2401

EXPRESS MAIL CERTIFICATE OF MAILING

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BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to the field of integrated circuits and, more particularly, to a method and apparatus for improved interconnections between an integrated circuit and a data processing system.

Related Application

The present invention is related to the U.S. Patent Application entitled "IC Package with Quick Connect Feature", Serial No. _____, and filed on _____.

Description of the Related Art

Integrated circuit (IC) cards (also referred to as electronic function cards) are used with data processing systems to provide increased functionality for the data processing system. IC cards may be used for many purposes such as providing additional memory with a memory card or providing digital storage for such applications as cameras and mobile telephones. IC cards may also provide communication capabilities for a data processing system with external data processing systems or networks by functioning as a modem card, a facsimile card, a local area network (LAN) interface card, and/or a multimedia interface card. The IC cards provide convenience for users in allowing the user to install as needed or desired additional capabilities or features for the data processing system.

IC cards are generally portable cards, often referred to as small form factor cards, that may be inserted into and detached from a receptacle within the data processing system. The small form factor card dimensions are designed to correspond with the particular receptacle into which they will be inserted. Although leads may be

soldered between the card and the data processing system, more typically the card has a connector built in and the card is inserted into a receptacle of the host data processing system (also referred to as a host socket). Once inserted into the receptacle of the data processing system, an electrical interface is made between the card connector and the data processing system allowing for communication between the card components and the data processing system.

The IC card itself generally contains a printed circuit board (PCB) attached to a connector, which serves as the IC card connector, with an IC package then mounted on the PCB. Metallized lines on the PCB allow communication between the IC package and the card connector. In electrically connecting the IC package to the PCB, there are typically two levels of interconnection involved. First, an IC die is enclosed within an insulating housing that includes a lead frame having a plurality of leads extending externally from the housing to form an IC package. The leads may be either pins extending from the housing or bump leads on the surface of the housing. The leads are internally connected to the IC die and permit the IC die, now encased within the housing, to connect to and communicate with other devices. The second level of interconnection provides an electrical connection of the IC package and connector to the PCB.

There are different methods of connecting the IC package and connector to the PCB. One standard method, referred to as surface mount technology (SMT), is typically used with a thin small outline package (TSOP). With SMT, the TSOP leads are directly soldered to the PCB. The leads must be placed at the desired location on the PCB and then soldered to the PCB. The coplanarity between the leads and the

PCB must be tight, and the location of the leads on the PCB must be accurate. Even with robotics performing the soldering process, the time and expense necessary to ensure a workable interconnection between the IC package and the PCB is great.

When soldering an IC package to a PCB, there is a substantial amount of testing required due to the multiple steps involved in assembling the IC card. First, there is a wafer level test on the IC die. Then, after the IC die has been encased in a housing to form an IC package, the connection between the IC die and the leads of the IC package must be checked. Once the IC package and connector are mounted on the PCB, the connections between the leads on the IC package and connector and the metallized lines of the PCB are tested to ensure that nothing was damaged in the soldering process. After the PCB and the IC package and connector mounted thereon are encased in a card casing to form an IC card, the IC card is tested to ensure a workable electrical interface between the components on the PCB and the receptacle of the data processing system. Often, the tests of the connection between the IC package and connector and the PCB and the final IC card product may be done simultaneously in a single step. Thus, as many as four separate testing phases may be required to ensure that the IC die can effectively communicate with the data processing system.

The present invention describes a method and apparatus allowing the leads of an IC package to provide the electrical interface between the IC package and the data processing system into which the IC package is inserted, without the use of a PCB and connector. Because PCBs and connectors are no longer required to make the connection between the IC package and the data processing system, the manufacturing steps of soldering the IC package onto the PCB and the connector onto

the PCB are eliminated. By eliminating the need for soldering both the IC package and the connector to the PCB, less material will be used, fewer leads will be damaged, and significant time will be saved during the assembly process. Additionally, eliminating the interconnections of the IC package and the connector to the PCB reduces the testing requirements during assembly from as many as four steps to as few as two. Thus, the elimination of the PCB and connector within the IC card improves the IC card's reliability while simultaneously decreasing both the expense and time associated with assembling the IC card.

SUMMARY OF THE INVENTION

The present invention describes a method and apparatus allowing the leads of an integrated circuit (IC) package to provide the electrical interface between an IC package and the data processing system into which the IC package is inserted. The present invention comprises an IC package, which is directly inserted into a data processing system. The IC package may be housed within a card casing similar to the form factor cards currently used. When housed within a casing to form an IC card, the leads from the IC package provide the electrical interface between the IC card and the data processing system into which the IC card is inserted.

The present invention eliminates the need for a printed circuit board (PCB) and connector to provide an interconnection between the IC package and the data processing system. The elimination of the PCB and connector greatly reduces the complexity of the assembly of an IC card by eliminating the manufacturing step of soldering the IC package to the PCB. Additionally, testing is simplified since the connections from the IC package to the PCB and the PCB to the card connector are eliminated.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a pictorial illustration of an integrated circuit (IC) package with lead pins extending from the IC package.

FIG. 2A is a side view of a casing for housing an IC package to form an IC card such that once the IC package is inserted into the casing the leads from the IC package serve as the electrical interface between the IC card and the data processing system into which the IC card is inserted.

FIG. 2B is a side view of the assembled IC card of FIG. 2A.

FIG. 3A is a side view of a casing for housing an IC package to form an IC card such that once the IC package is inserted into the casing the leads from the IC package serve as the electrical interface between the IC card and the data processing system into which the IC card is inserted.

FIG. 3B is a side view of the assembled IC card of FIG. 3A.

FIG. 4A is a pictorial illustration of an IC card such as the ones shown in FIGS. 2B and 3B.

FIG. 4B is a pictorial illustration of a receptacle in the host data processing system corresponding to the IC card shown in FIG. 4A.

FIG. 5 is a pictorial illustration of an IC package in which the leads are supported and function as a blade on pad connection.

FIG. 6 is a pictorial illustration of a receptacle in the host data processing system in which the IC package shown in FIG. 5 may be directly inserted.

DETAILED DESCRIPTION OF THE INVENTION

The following detailed description sets forth several embodiments in accordance with the present invention for allowing the leads from an integrated circuit (IC) package to provide the electrical interface between the IC die and the data processing system into which the IC package is inserted. In the following description, details are set forth such as specific dimensions, IC card applications, configurations, connections, etc., in order to prove a more thorough understanding of the present invention. It will be appreciated by one skilled in the art, however, that the present invention may be practiced without these specific details. In other instances, well-known devices, structures, techniques, etc., have not been described in particular detail so as to not obscure the present invention. Each of the different embodiments of the present invention is discussed as used with a data processing system. Note, however, that each embodiment may be used with other types of data processing devices.

In the prior art, an integrated circuit (IC) card generally contains a printed circuit board (PCB) attached to a connector, which serves as the IC card connector, with an IC package then mounted on the PCB. Metallized lines on the PCB allow communication between the IC package and the card connector. In electrically connecting the IC package to the PCB, there are typically two levels of interconnection involved. First, an IC die is housed within an insulating package that includes a lead frame having a plurality of leads extending externally from the package to form the IC package. The leads may be either pins extending from the package or bump leads on the surface of the package. The leads are internally connected to the IC die and permit the IC die, now encased within the package, to be coupled to other devices. The second level of

interconnection provides electrical connections of the IC package and connector to the PCB and involves soldering the IC package and connector to the PCB. This second level of interconnection accounts for a large portion of the time and cost associated with manufacturing an IC card.

The present invention describes an apparatus and method that eliminates the need for the PCB and connector, and the second level of interconnection. Instead of an IC package coupled to a PCB and connector that is then housed within a casing to form an IC card, the present invention comprises an IC package connecting directly to the data processing system, with the IC package containing the functionality of the IC package, PCB, and connector. The IC package may be housed within a card casing (or package) similar to the form factor cards currently used. The IC package is placed within the casing to form an IC card such that when the IC card is inserted into the data processing system, the leads from the IC package serve as the electrical interface between the card and the data processing system.

Note that with the present invention, the IC package component itself may be the final product. This not only eliminates the need for a PCB and connector, but also eliminates the need for a card casing to house the IC package. The IC package component without a casing can be used when a smaller form factor card is required, for example when providing cell phone memory or providing an exchangeable memory interface.

FIG. 1 is a pictorial illustration of an integrated circuit (IC) package with lead pins extending from the IC package, which is a typical IC package for use with the present invention. The IC package 8 is comprised of an IC die encased within a housing 10.

The IC die is mounted on a lead frame having multiple lead pins 12 extending from the housing 10. The lead pins 12 are connected internally to the IC die leads and extend from the housing 10 to allow the now protected IC die to connect to and communicate with other devices.

FIGS. 2A and 2B are side views of a first embodiment of the present invention. FIG. 2A shows a side view of a casing for housing an IC package to form an IC card such that once the IC package is inserted into the casing the leads from the IC package serve as the electrical interface between the IC card and the data processing system into which the IC card is inserted.

The IC package 8 (see FIG. 1) is inserted into the casing 14 through the back opening 15. The casing 14 is preferably a single piece of plastic formed from injection molding. As with current form factor cards, the dimensions of the casing 14 may be defined by both the size and shape of the IC package that is to be housed within the casing, and the dimensions of the receptacle of the data processing system into which the IC card is inserted. The casing 14 provides both physical and electrostatic discharge (ESD) protection for the IC package 8 encased therein.

As the IC package 8 is inserted into the casing 14, the stops 16 will encounter the front corners of the housing 10 of the IC package 8. However, as the IC package 8 is inserted into the casing 14, the casing 14 will slightly expand and allow the IC package 8 to be inserted past the stops 16. The IC package 8 is inserted into the casing 14 until the front edge of the housing 10 rests against the inner stops 17. Once the IC package 8 is fully inserted into the casing 14, the stops 16 will lower back into position and hold the IC package 8 securely within casing 14. The stops 16 are

functioning as snap locks to hold the IC package 8 in place within the casing 14. FIG. 2B is a side of the assembled IC card 19 comprising the casing 14 with the IC package 8 fully inserted therein.

FIG. 4A is a pictorial illustration of the casing 14 and the inserted IC package 8. Through a front opening 18, the leads 12 of the IC package 8 are visible. FIG. 4B is a pictorial illustration from a bottom view of a receptacle 30 of a data processing system into which the IC card 19 may be inserted. The IC card 19 is inserted into the receptacle 30 along the guide arms 34. The contacts 32 of the receptacle 30 extend into the opening 18 of the IC card 19 such they are in contact with the leads 12. Typically, the contacts 32 on the receptacle 30 are spring mounted to allow a variation in the exact position and dimensional tolerances of the inserted IC package 8 leads 12 and to ensure the electrical interface is made.

The leads 12 of the IC package 8 form the electrical interface between the IC card 19 and the contacts 32 of the receptacle 30 of the host data processing system. Thus, a PCB and connector are not required to form the interconnection between the IC package and the data processing system.

A second embodiment of the present invention is illustrated in FIGS. 3A and 3B. FIG. 3A is a side view of a casing for housing an IC package to form an IC card such that once the IC package is inserted into the casing the leads from the IC package serve as the electrical interface between the IC card and the data processing system into which the IC card is inserted. Unlike the first embodiment, the second embodiment involves inserting the IC package from the bottom of the casing using a rotating movement.

In this embodiment, an IC package 23, comprised of an IC die encased within a housing 20 with leads 21 connected internally to the IC die and extending from the housing 20, is rotated into position within a casing 26 to form an IC card 29. A bottom opening 25 in the bottom surface of the casing 26 allows the leads 21 of the IC package 23 to be angled into position within the casing 26. The housing 20 of the IC package 23 is then rotated into position within the casing 26. Note that the angled stop 24 on the card casing 26 will encounter the back upper edge of the housing 20 of the IC package 23. The back side of the card casing 26, however, will expand back when pressed upon and allow the IC package 23 to be rotated into position. Once the IC package 23 has been fully rotated into position within the casing 26, the angled stop 24 will move back into its original position and will fit into the angled notch 22 on the housing 20 of the IC package 23. The angled stop 24 residing within the angled notch 22 will hold the IC package 23 within the casing 26 securely. The stop 24 is functioning as a snap lock to hold IC package 23 securely in place within the casing 26. Note that the lower surface of the housing 20 partially forms one side of the IC card 29.

Once the IC package 23 is fully rotated into position within the card casing 26, an IC card 29 is formed that is similar to the card 19 shown in FIG. 4A. The IC card 29 can then be inserted into a receptacle of a data processing system such as the one shown in FIG. 4B. As with the first embodiment described above, the card 29 is inserted into the receptacle 30 along the guide rails 34. The contacts 32 of the receptacle 30 will extend through the opening 28 of the card 29 and contact the leads 21 to form the electrical interface between the IC package 23 and the data processing system and allow communication between the same.

As in the first embodiment, the leads 21 of the IC package 23 form the electrical interface between IC card 29 and the contacts 32 of the receptacle 30 of the host data processing system. Thus, a PCB and connector are not required to form the interconnection between the IC package and the data processing system.

The first and second embodiments described above show an IC package housed within a casing to form an IC card, such that the leads from the IC package provide the electrical interface between the IC card and the data processing system the IC card is inserted into. Although both embodiments are illustrated using an IC package with multiple lead pins extending from the IC package, each embodiment may be modified to allow other types of IC packages, such as packages having bump leads or a blade-on-pad socket system, to be used with the present invention. Likewise, the design of the casing may be modified to conform to a variety of shapes and sizes as required by the user. The casing may also have the opening used to insert the IC package and the opening used to achieve an electrical interface between the IC package and the data processing system positioned in a variety of locations on the casing, as long as the leads from the IC package are able to provide the electrical interface between the IC card and the data processing system. In this manner, IC cards of the prior art are significantly improved through the elimination of a PCB and connector.

The present invention may also be used to allow an IC package itself to be directly inserted into a data processing system. This will not only eliminate the PCB and connector, along with the required interconnections associated with the PCB, connector, and IC package, but will also eliminate the need for a casing to house the IC

package. The elimination of the casing is an additional cost savings, both from the elimination of materials and from the decrease in assembly time.

When directly inserting an IC package into a data processing system, the leads of the IC package should be robust and/or supported by the IC die housing to ensure that they may effectively provide the electrical interface between the IC package and the data processing system without a constant threat of damaged leads. Thus, although different types of IC packages may be used, an IC package having a "blade on pad" socket system is preferred when inserting an IC package directly into a data processing system.

FIG. 5 shows an IC package having a "blade on pad" socket system for use with the present invention. In the IC package 40, an IC die is encased within the housing 42 and leads 44 are internally coupled to the IC die and extend from the housing 42 to allow the IC die to be connected to and communicate with other devices. Unlike the IC package 8 with the lead pins 12 shown in FIG. 1, this IC package 40 uses what is typically referred to as pads in a "blade on pad" socket system. A blade on pad IC package is one where the leads 44 are supported by a support 46 of the housing 42. The leads 44 are generally flush with the upper surface of the support 46. Because the leads 44 are supported, the need for a card casing is greatly reduced. Thus, the IC package 40 may itself be directly inserted into a receptacle of a data processing system, such as the one shown in FIG. 6.

The IC package 40 is inserted directly into the receptacle 50 and along the guide arms 52 until the front edge of the support 46 is in contact with the back inner surface 58 of the receptacle 50. Contacts 54 will press against the leads 44 when the IC

package 40 is fully inserted into the receptacle 50 and will form the electrical interface between the IC package and the data processing system. As in the first two embodiments, the leads 44 of the IC package 40 form the electrical interface with the contacts 54 of the receptacle 50 of the host data processing system. Thus, a PCB, connector, and casing are not required to form the interconnection between the IC package and the data processing system.

In each of the above embodiments, the housing of the IC package is a plastic (organic resin) overmold with the IC die mounted directly onto the lead frame within the housing. In the embodiments requiring a card casing, the casing into which the IC package is inserted is a preferably a single piece of plastic formed from injection molding. As with current form factor cards, the dimensions of the casing of the present invention may be defined by both the size and shape of the IC package that is housed within the casing and the dimensions of the receptacle of the host data processing system into which the IC card is inserted.

The leads from the IC package serving as the electrical interface with the receptacle of the host data processing system will be made according to industry standards, typically of beryllium copper, plated copper, etc. Typically, the contacts on the receptacle of the host data processing system are spring mounted to allow a variation in the exact position and dimension tolerances of the inserted IC package leads and to ensure an electrical interface is made.

Thus, the present invention describes an IC card that eliminates the PCB and connector entirely by allowing the leads from the IC package to serve as the electrical interface between the IC card and the data processing system. Because a PCB with a

connector is no longer required to make the connection between the IC package and the data processing system, the manufacturing steps of soldering the IC package and connector onto the PCB are eliminated. By eliminating the need for soldering the IC package and connector to the PCB, less material will be used, fewer leads will be damaged, and significant time will be saved during the assembly process.

CLAIMS

WE CLAIM:

1. An integrated circuit (IC) card for use in a data processing device, comprising:

an IC package having multiple leads extending from said package;

a casing that encases said package, such that when said casing is inserted into said data processing device, said leads provide an electrical interface between said IC package and said data processing device without the use of a printed circuit board and a connector.

2. The IC card of claim 1 wherein said casing has a front surface having a front opening, such that when said IC package is inserted into said casing, said IC package and said data processing device form said electrical interface through said front opening.

3. The IC card of claim 2 wherein said casing has a back surface having a back opening such that said IC package is inserted into said casing through said back opening.

4. The IC card of claim 3 wherein said casing has at least one stop at said back opening such that when said IC package is fully inserted into said casing, said stop holds said package securely within said casing.

5. The IC card of claim 2 wherein said casing has a bottom surface having a bottom opening such that said IC package is inserted into said casing through said bottom opening.

6. The IC card of claim 5 wherein said casing has at least one stop at said bottom opening such that when said IC package is fully inserted into said casing, said stop holds said package securely within said casing.

7. A method of assembling an integrated circuit (IC) card for use in a data processing device, comprising the steps of:

providing an IC package, said package having multiple leads extending from said package;

providing a casing; and,

inserting said package into said casing, such that when said casing is inserted into said data processing device said leads provide an electrical interface between said IC package and said data processing device without the use of a printed circuit board and a connector.

8. The method of claim 7 wherein said step of providing a casing includes providing a casing having a front surface with a front opening, such that when said IC package is inserted into said casing, said IC package and said data processing device form said electrical interface through said front opening.

9. The method of claim 8 wherein said step of providing a casing includes providing a casing having a back surface with a back opening, and said step of inserting said IC package includes inserting said IC package through said back opening of said casing.

10. The method of claim 9 where said step of providing a casing includes providing a casing having at least one stop on said back opening such that when said IC package is fully inserted into said casing through said back opening, said stop holds said IC package securely within said casing

11. The method of claim 8 wherein said step of providing a casing includes providing a casing having a bottom surface with a bottom opening, and said step of inserting said IC package includes inserting said IC package through said bottom opening of said casing.

12. The method of claim 11 wherein said step of providing a casing includes providing a casing having at least one stop at said bottom opening such that when said IC package is fully inserted into said casing through said bottom opening, said stop holds said IC package securely within said casing.

13. A method of connecting an integrated circuit (IC) to a receptacle of a data processing device, comprising the step of:

providing an IC package having multiple leads extending from said package; and,

inserting said IC package into said data processing device such that said leads from said IC package provide the electrical interface between said IC package and said data processing device without the use of a printed circuit board or a connector.

14. The method of claim 13 wherein said step of providing an IC package includes providing an IC package having a blade on pad socket device.

ABSTRACT OF THE DISCLOSURE

An apparatus and method for allowing the lead pins of an integrated circuit (IC) package to provide the electrical interface between the IC package and a receptacle of the host data processing system is described. The present invention comprises an IC package housed within a card casing to form an IC card, with the leads from the IC package providing the electrical interface between the IC card and the data processing system into which the IC card is inserted. Thus, the present invention eliminates the need for a printed circuit board (PCB) and connector to provide the interconnection between the IC package and the data processing system.

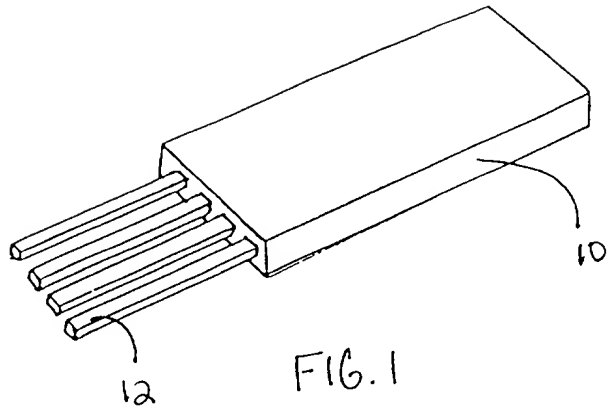

FIG. 1

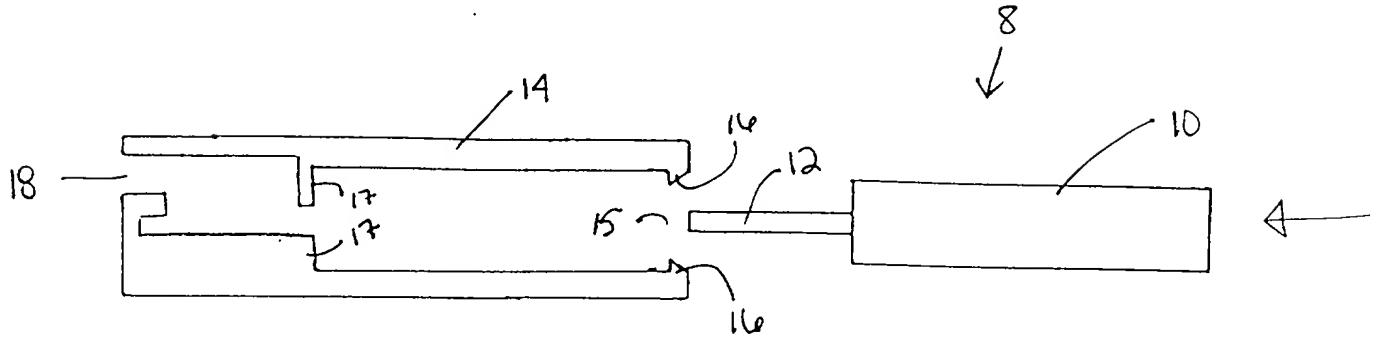

FIG. 2A

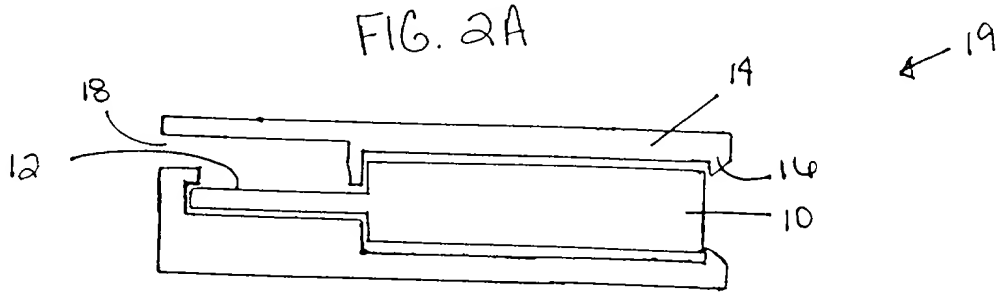

FIG. 2B

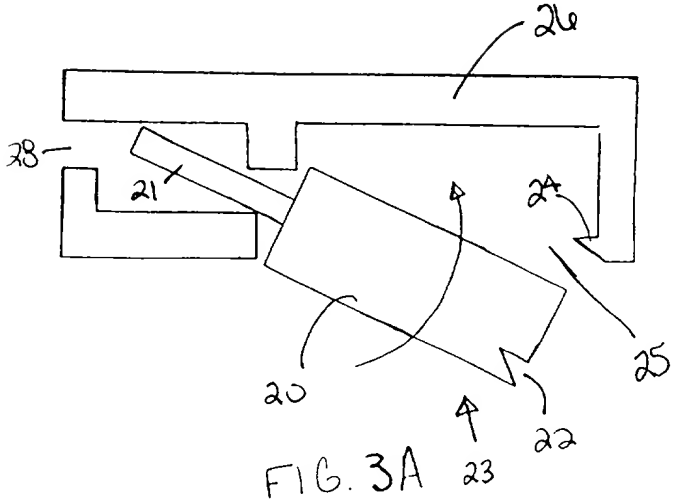

FIG. 3A

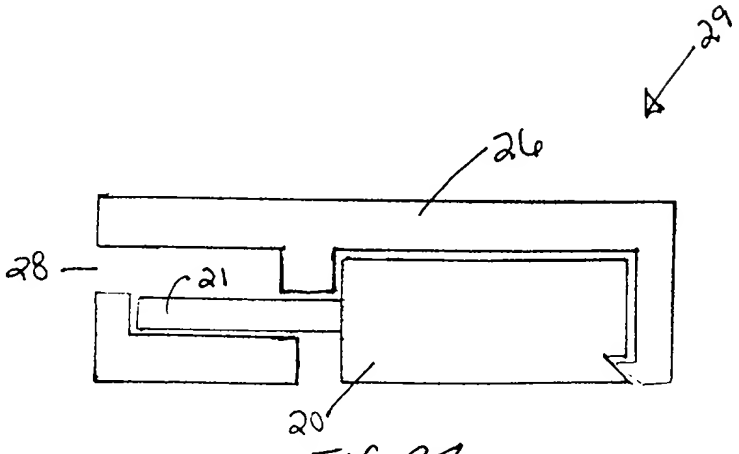

FIG. 3B

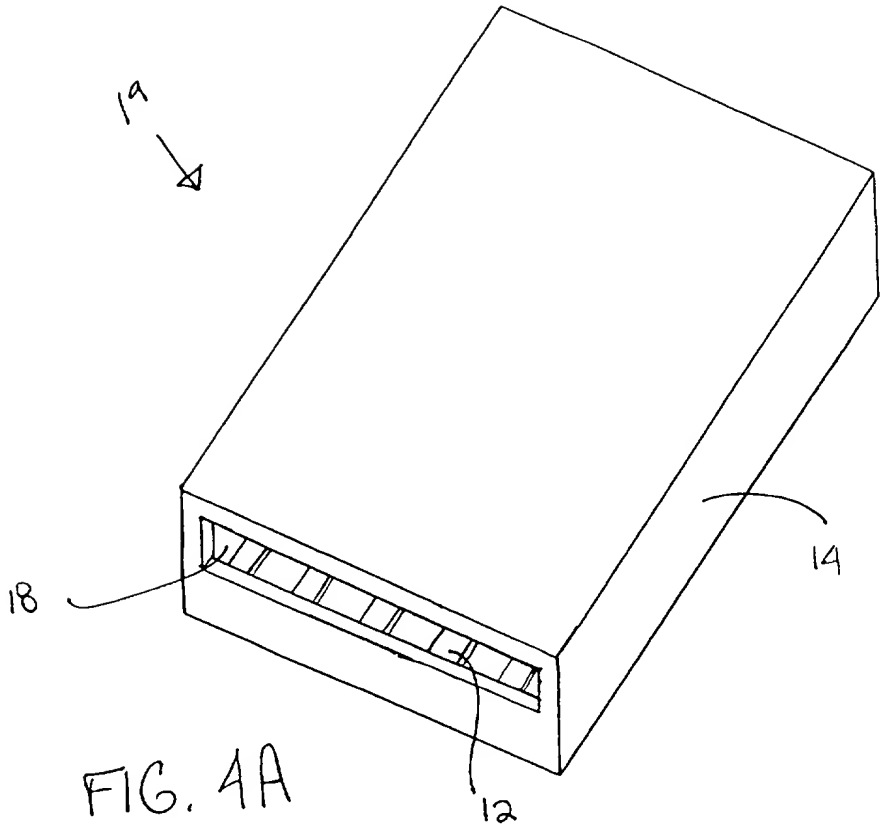

FIG. 4A

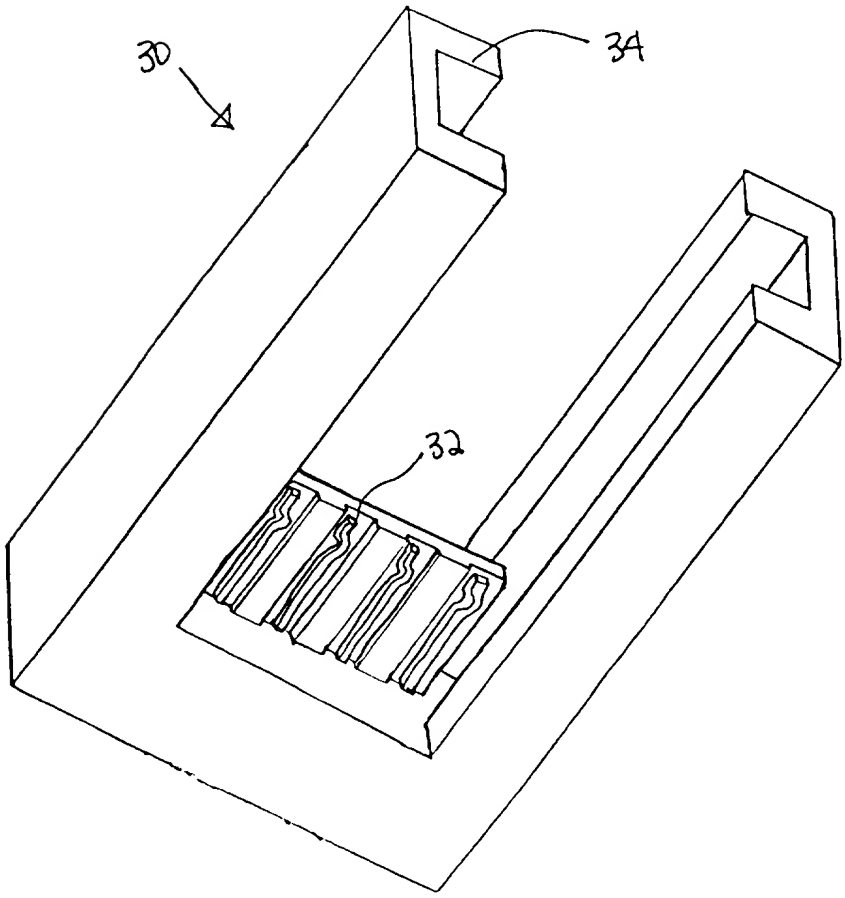

FIG. 4B

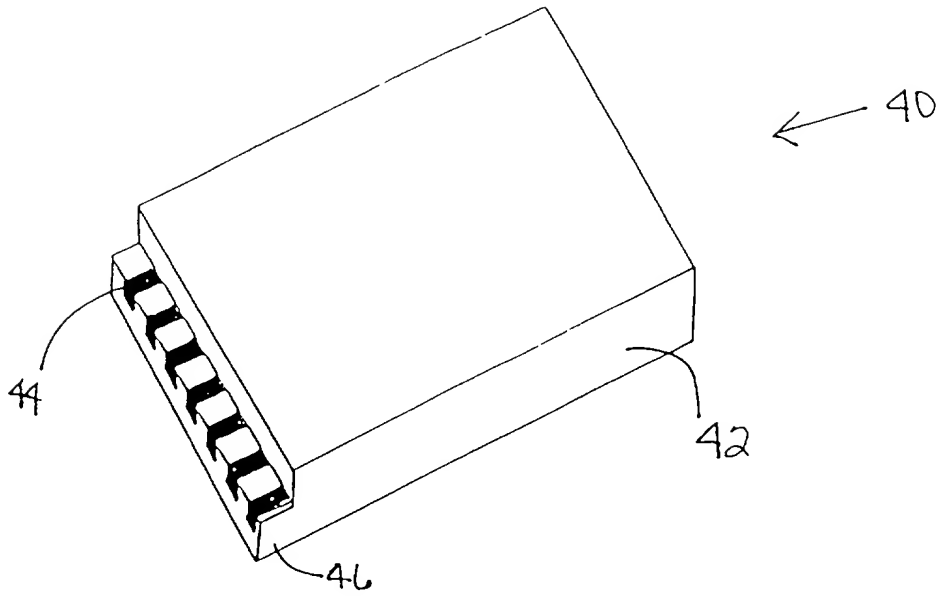

FIG. 5

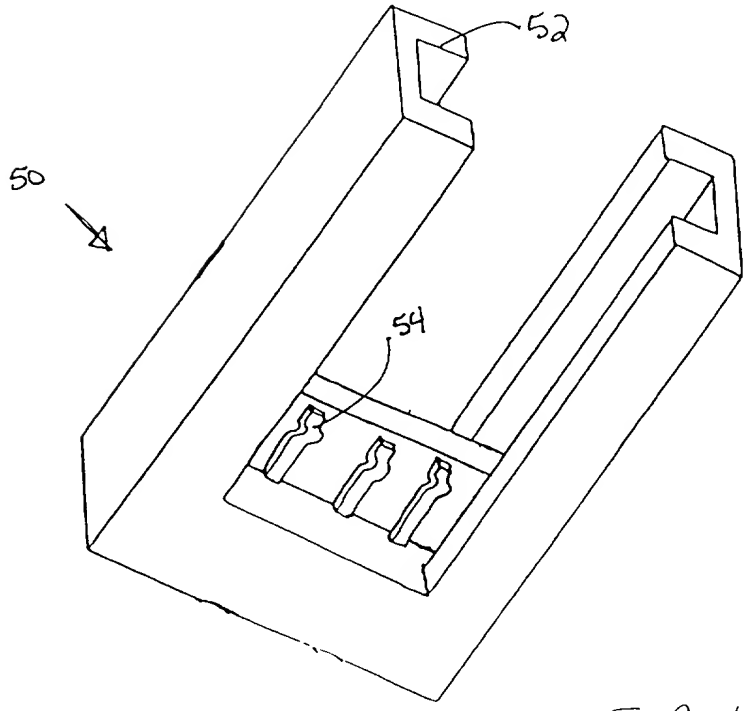

FIG. 6

Attorney's Docket No.: 0042390.P5444 PATENT

DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION
(FOR **INTEL CORPORATION** PATENT APPLICATIONS)

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below, next to my name.

I believe I am the original, first, and sole inventor (if only one name is listed below) or an original, first, and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled
" IC Package With Edge Connect Contacts"

the specification of which

_x_ is attached here to.
___ was filed on _____ as
United States Application Number _____
or PCT International Application Number_____
and was amended on _____.
(if applicable)

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claim(s), as amended by any amendment referred to above. I do not know and do not believe that the claimed invention was ever known or used in the United States of America before my invention thereof, or patented or described in any printed publication in any country before my invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months (for a utility patent application) or six months (for a design patent application) prior to this application.

I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119(a)-(d), of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority Claimed

(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No

I hereby claim the benefit under title 35, United States Code, Section 119(e) of any United States provisional application(s) listed below

(Application Number)	Filing Date
(Application Number)	Filing Date

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, Section 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application:

(Application Number)	Filing Date	(Status -- patented, pending, abandoned)
(Application Number)	Filing Date	(Status -- patented, pending, abandoned)

I hereby appoint Farzad E. Amini, Reg. No. P42,261; Aloysius T. C. AuYeung, Reg. No. 35,432; Amy M. Armstrong, Reg. No. P42,265; William Thomas Babbitt, Reg. No. 39,591; Jordan Michael Becker, Reg. No. 39,602; Bradley J. Bereznak, Reg. No. 33,474; Michael A. Bernadicou, Reg. No. 35,934; Roger W. Blakely, Jr., Reg. No. 25,831; Gregory D. Caldwell, Reg. No. 39,926; Kent M. Chen, Reg. No. 39,630; Lawrence M. Cho, Reg. No. 39,942; Yong S. Choi, Reg. No. P43,324; Thomas M. Coester, Reg. No. 39,637; Roland B. Cortes, Reg. No. 39,152; Barbara Bokanov Courtney, Reg. No. P42,442; William Donald Davis, Reg. No. 38,428; Michael Anthony DeSanctis, Reg. No. 39,957; Daniel M. De Vos, Reg. No. 37,813; Tarek N. Fahmi, Reg. No. 41,402; James Y. Go, Reg. No. 40,621; Richard Leon Gregory, Jr., P42,607; Dinu Gruia, Reg. No. P42,996; David R. Halvorson, Reg. No. 33,395; Thomas A. Hassing, Reg. No. 36,159; Eric Ho, Reg. No. 39,711; Willmore F. Holbrow III, Reg. No. P41,845; George W Hoover II, Reg. No. 32,992; Eric S. Hyman, Reg. No. 30,139; Dag H. Johansen, Reg. No. 36,172; William W. Kidd, Reg. No. 31,772; Tim L. Kitchen, Reg. No. P41,900; Michael J. Mallie, Reg. No. 36,591; Andre L. Marais, under 37 C.F.R. § 10.9(b); Paul A. Mendonsa, Reg. No. P42,879; Darren J. Milliken, P42,004; Thinh V. Nguyen, P42,034; Kimberley G. Nobles, Reg. No. 38,255; Michael A. Proksch, Reg. No. P43,021; Ronald W. Reagin, Reg. No. 20,340; Babak Redjaian, P42,096; James H. Salter, Reg. No. 35,668; William W. Schaal, Reg. No. 39,018; James C. Scheller, Reg. No. 31,195; Anand Sethuraman, Reg. No. P43,351; Charles E. Shemwell, Reg. No. 40,171; Maria McCormack Sobrino, Reg. No. 31,639; Stanley W. Sokoloff, Reg. No. 25,128; Allan T. Sponseller, Reg. No. 38,318; Steven R. Sponseller, Reg. No. 39,384; Geoffrey T. Staniford, P43,151; Judith A. Szepesi, Reg. No. 39,393; Vincent P. Tassinari, Reg. No. P42,179; Edwin H. Taylor, Reg. No. 25,129; George G. C. Tseng, Reg. No. 41,355; Lester J. Vincent, Reg. No. 31,460; John Patrick Ward, Reg. No. 40,216; Stephen Warhola, Reg. No. P43,237; Ben J. Yorks, Reg. No. 33,609; and Norman Zafman, Reg. No. 26,250; my attorneys; and Robert Andrew Diehl, Reg. No. 40,992; and Edwin A. Sloane, Reg. No. 34,728; my patent agents, of BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP, with offices located at 12400 Wilshire Boulevard, 7th Floor, Los Angeles, California 90025, telephone (310) 207-3800,
and Alan K. Aldous, Reg. No. 31,905; Joseph R. Bond, Reg. No. 36,458; Richard C. Calderwood, Reg. No. 35,468; Cynthia Thomas Faatz, Reg No. 39,973; Sean Fitzgerald, Reg. No. 32,027; Seth Z. Kalson, Reg. No. 40,670; David J. Kaplan, Reg. No. 41,105; Leo V. Novakoski, Reg. No. 37,198; Naomi Obinata, Reg. No. 39,320; Thomas C. Reynolds, Reg. No. 32,488; Steven P. Skabrat, Reg. No. 36,279; Howard A. Skaist, Reg. No. 36,008; Steven C. Stewart, Reg. No. 33,555; Raymond J. Werner, Reg. No. 34,752; and Charles K. Young, Reg. No. 39,435; my patent attorneys, and Jeffrey S. Draeger, Reg. No. 41,000; Thomas Raleigh Lane, Reg. No. P42,781; Calvin E. Wells, Reg. No. P43,256; and Alexander Ulysses Witkowski, Reg. No. P43,280; my patent agents, of INTEL CORPORATION; and James R. Thein, Reg. No. 31,710, my patent attorney; with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected herewith.

Send correspondence to Amy M. Armstrong (Name of Attorney or Agent), BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN LLP, 12400 Wilshire Boulevard, 7th Floor, Los Angeles, California 90025 and direct telephone calls to Amy M. Armstrong (Name of Attorney or Agent), (512) 434-2400.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full Name of Sole/First Inventor Steven R. Eskildsen

Inventor's Signature _____ Date June 15, 1998

Residence Folsom, California (City, State) Citizenship U.S.A. (Country)

Post Office Address 307 Oak Canyon Way
Folsom, California 95630

Full Name of Second/Joint Inventor Jeffrey C. Franz

Inventor's Signature _____ Date 6/16/98

Residence El Dorado Hills, California (City, State) Citizenship U.S.A. (Country)

Post Office Address 3390 Kensington Drive
El Dorado Hill, California 95762

Full Name of Third/Joint Inventor David S. Brannam

Inventor's Signature _____ Date 6/16/98

Residence Cameron Park, California (City, State) Citizenship U.S.A. (Country)

Post Office Address 3008 Bridlewood Drive
Cameron Park, California 95682

Full Name of Fourth/Joint Inventor _____

Inventor's Signature _____ Date _____

Residence _____ (City, State) Citizenship _____ (Country)

Post Office Address _____

Title 37, Code of Federal Regulations, Section 1.56

Duty to Disclose Information Material to Patentability

(a) A patent by its very nature is affected with a public interest. The public interest is best served, and the most effective patent examination occurs when, at the time an application is being examined, the Office is aware of and evaluates the teachings of all information material to patentability. Each individual associated with the filing and prosecution of a patent application has a duty of candor and good faith in dealing with the Office, which includes a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclosure information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned. Information material to the patentability of a claim that is cancelled or withdrawn from consideration need not be submitted if the information is not material to the patentability of any claim remaining under consideration in the application. There is no duty to submit information which is not material to the patentability of any existing claim. The duty to disclosure all information known to be material to patentability is deemed to be satisfied if all information known to be material to patentability of any claim issued in a patent was cited by the Office or submitted to the Office in the manner prescribed by §§1.97(b)-(d) and 1.98. However, no patent will be granted on an application in connection with which fraud on the Office was practiced or attempted or the duty of disclosure was violated through bad faith or intentional misconduct. The Office encourages applicants to carefully examine:

(1) Prior art cited in search reports of a foreign patent office in a counterpart application, and

(2) The closest information over which individuals associated with the filing or prosecution of a patent application believe any pending claim patentably defines, to make sure that any material information contained therein is disclosed to the Office.

(b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made or record in the application, and

(1) It establishes, by itself or in combination with other information, a prima facie case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A prima facie case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

(c) Individuals associated with the filing or prosecution of a patent application within the meaning of this section are:

(1) Each inventor named in the application;

(2) Each attorney or agent who prepares or prosecutes the application; and

(3) Every other person who is substantively involved in the preparation or prosecution of the application and who is associated with the inventor, with the assignee or with anyone to whom there is an obligation to assign the application.

(d) Individuals other than the attorney, agent or inventor may comply with this section by disclosing information to the attorney, agent, or inventor.